

To: Kensil Garnett Attn: Craig Emberton

From: Maureen M. Addis

Subject: Pavement Design Approval

Date: September 8, 2017

Route: Mattis Avenue Contract #2 of I-57/74 Interchange

Section: (10-34HB-3)BR & (10-5-1HB)BR-1 Contract No.: 70B38 County: Champaign Target Letting: FY 2018

Limits: Over I-57 and I-74 at Champaign

On September 8, 2017, the Pavement Selection Committee met to review the pavement design for the above referenced project which was submitted on June 30, 2017.

The scope of the project involves replacing the structures carrying Mattis Avenue over I-57 and I-74 in order to accommodate reconstruction of the I-57/74 interchange. The length of Mattis Ave. over I-57 to be reconstructed is 271 feet and the cross-section will be two 12' lanes with 8' shoulders. The length of Mattis Ave. over I-74 to be reconstructed is 273 feet and the cross-section will be four 12' lanes with a 12' flush median and 4' paved shoulders.

The pavement design resulted in two pavement options for small segment:

- Mattis Ave. over I-57: 9.25" Full-Depth HMA and 8.25" PCC. The life-cycle cost analysis of those options resulted in the HMA pavement being 8% less expensive (\$88,935 compared to PCC's cost of \$96,079). Due to the short length of the improvement combined with the existing HMA pavement along the rest of Mattis Ave., the District preferred the HMA option in-lieu of alternate bidding.
- Mattis Ave. over I-74: 9.25" Full-Depth HMA and 8.25" PCC. The life-cycle cost analysis of those options resulted in the HMA pavement being 12.4% less expensive (\$157,008 compared to PCC's cost of \$176,549). Due to the HMA's lower cost, the short length of the improvement and the existing HMA pavement along the rest of the roadway, the District preferred the HMA option.

The Pavement Selection Committee concurred with the District's preferences. In summary, the approved pavement designs are as follows:

Mattis Ave. over I-57 9.25" Full-Depth HMA Pavement with HMA Shoulders 12" Improved Subgrade

Mattis Ave. over I-74: 9.25" Full-Depth HMA Pavement with HMA Shoulders 12" Improved Subgrade

If you have any questions, please contact Mike Brand at (217) 782-7651.

Pavement Design

F.A.I. 57 (I-57) and F.A.I. 74 (I-74) Interchange Reconstruction

Contract 2: 70B38
Section (10-34HB-3)BR & (10-5-1HB)BR-1
Mattis Ave over I-57 & Mattis Ave over I-74

Champaign, IL Champaign County



June 2017

Prepared For:



Region 3 – District 5

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Exhibits

Exhibit 1: Location Map

Exhibit 2: Project Overview

Exhibit 3: Proposed Typical Sections

Exhibit 4: Roadway Geotechnical Report

Exhibit 5: Traffic Data

Exhibit 6: Mechanistic Pavement Design and Life-Cycle Cost Analysis

I. Introduction

This project is located at the Interstate 57 (I-57) & Interstate 74 (I-74) interchange on the northwest side of the City of Champaign, located in the central portion of Champaign County (see **Exhibit 1: Location Map**). The proposed scope of work includes the reconstruction of the I-74 & I-57 interchange and replacement of the existing full cloverleaf interchange with a semi-directional interchange with two directional flyovers, two loops, and four outer ramps.

The proposed improvements include pavement reconstruction and lane additions in each direction on I-74 from Duncan Road to North Prospect Avenue, pavement reconstruction of I-57 from the Norfolk Southern Railroad to Olympian Drive with accommodations for future lane additions to the inside, I-57 & I-74 ramp reconfiguration and pavement construction of eight new ramps, pavement reconstruction at three grade separation roadway approaches along Mattis Avenue and U.S. 150 (Bloomington Road), pavement reconstruction of two ramp terminals at I-57 & Olympian Drive, pavement reconstruction of two ramp terminals at I-74 & Prospect Avenue, and pavement reconstruction along Midwest Court (see **Exhibit 2: Project Overview**).

This project is currently planned to be completed under four separate construction contracts. The current contracts anticipated are:

- Contract 1 70B98: U.S. 150 (Bloomington Road) over I-57 roadway pavement and grade separation structure Section (10-34HB)BR-1
- Contract 2 70B38: Mattis Avenue over I-57 & I-74 roadway pavements and grade separation structures Section (10-34HB-3)BR&(10-5-1HB)BR-1
- Contract 3 70B99: I-57 & I-74 interchange ramp roadway pavements and structures (except Ramps A & H) Section (10-34-1)HBK
- Contract 4 70C01: I-57 & I-74 roadway pavements and structures and all remaining ramp roadway pavements Section (10-34HB-3)BR&(10-5-1HB)BR-1

II. Pavement Design and Life-Cycle Cost Analysis

The IDOT Mechanistic Pavement Design and Life-Cycle Cost Analysis (LCCA) spreadsheet (Rev. 09/05/2013) was utilized to determine the proposed pavement materials, thicknesses, and costs included herein. Standard equivalency factors for SU and MU vehicles were used to assume the mix of fully loaded, partially loaded, and empty vehicles for calculation of the traffic factors. The structural design traffic is shown for each roadway in **Exhibit 5: Traffic Data**. Full-depth pavement designs were performed for Contract 2 for the following roadways:

- Mattis over I-57
- Mattis over I-74

Pavement and shoulder removal costs were not included in the LCCA since they are required for all feasible designs. The rigid pavement designs include a 4" stabilized subbase in accordance with BDE Section 54-4.01(h)-2 and BDE Figure 54-4.D. A 4" stabilized subbase is not required by policy for the Mattis over I-74 roadway approaches but has been included for analysis purposes. 12" aggregate subgrade improvements are proposed for both roadways. These subgrade improvements satisfy the requirements in BDE Section 54-4.01(h)-1 and the recommendations in the Roadway Geotechnical Report. See Exhibit 4: Roadway Geotechnical Report.

A. Mattis Avenue over I-57

The grade separation and roadway approaches for Mattis Avenue over I-57 are proposed to be single 12' lanes in each direction with 8' paved shoulders along both edges of pavement. See **Exhibit 3: Proposed Typical Sections**. The total roadway approach length for Mattis Avenue over I-57 full depth pavement reconstruction is 271 feet.

Full depth shoulders are recommended for Mattis over I-57 to accommodate staged construction for this project and future maintenance and reconstruction activities.

The Mechanistic Pavement Design and Life-Cycle Cost Analysis for Mattis Avenue over I-57 with full depth shoulders is summarized below. See **Exhibit 6: Mechanistic Pavement Design and Life-Cycle Cost Analysis** for detailed calculations.

Width over 1371 definent besign & LeeA										
	Traffic Factor	Depth (in)	Initial Cost	Life-Cycle Cost						
НМА	1.61	9.25	\$61,475	\$88,935						
JPCP	2.25	8.25	\$76,591	\$96,079						

Mattis over I-57 Pavement Design & LCCA

The results of the Life-Cycle Cost Analysis indicate that HMA is the lowest cost option compared to JPCP by 8.0%.

Although the LCCA did not result in one design being more than 10% cheaper than the other, the alternate pavement bidding process should not be considered for this roadway. The improvement along Mattis over I-57 is less than two lane-miles, so it does not meet BDE Section 54-1.04(a) criteria to be considered for alternate bidding. Also, the adjoining pavement surface on either end of the proposed improvement is HMA, so a rigid pavement structure for this short section of roadway is not recommended.

The recommended pavement design for Mattis Avenue over I-57 is a flexible pavement with a thickness of 9.25 inches and full depth HMA shoulders:

Lane Pavement

- HMA Pavement (Full-Depth), 9.25"
 - o Polymerized HMA Surface Course, Mix "D", N70, 2" (IL-9.5, SBS PG 64-28)
 - o Polymerized HMA Binder Course, IL-19.0, N70, 2.25" (SBS PG 64-28)
 - HMA Binder Course, IL-19.0, N70, 5" (PG 64-22)
- Subbase Granular Material Type A, 12"

Shoulder Pavement

- HMA Shoulders, 9.25"
 - HMA Surface Course, Mix "C", N50, 2" (PG 64-22)
 - HMA Binder Course, IL-19.0, N50, 7.25" (PG 64-22)
- Subbase Granular Material Type A, 12"

B. Mattis Avenue over I-74

The grade separation and roadway approaches for Mattis Avenue over I-74 are proposed to be two 12' lanes in each direction with a 12' paved flush median and 4' paved shoulders along both edges of pavement with B-6.24 combination concrete curb and gutter. See **Exhibit 3: Proposed Typical Sections**. The total roadway approach length for Mattis Avenue over I-74 full depth pavement reconstruction is 273 feet.

Full depth shoulders are recommended for Mattis over I-74 to accommodate staged construction for this project and future maintenance and reconstruction activities.

The Mechanistic Pavement Design and Life-Cycle Cost Analysis for Mattis Avenue over I-74 with full depth shoulders is summarized below. See **Exhibit 6: Mechanistic Pavement Design and Life-Cycle Cost Analysis** for detailed calculations.

Mattis over I-74 Pavement Design & LCCA

	Traffic Factor	Depth (in)	Initial Cost	Life-Cycle Cost
НМА	1.50	9.25	\$119,022	\$157,008
JPCP	1.84	8.25	\$145,112	\$176,549

The results of the Life-Cycle Cost Analysis indicate that HMA is the lowest cost option compared to JPCP by 12.4%.

A rigid pavement structure is not recommended for this roadway, because the adjoining pavement on either end of the proposed improvement is HMA and the life-cycle cost analysis resulted in the HMA being more than 10% cheaper than JPCP.

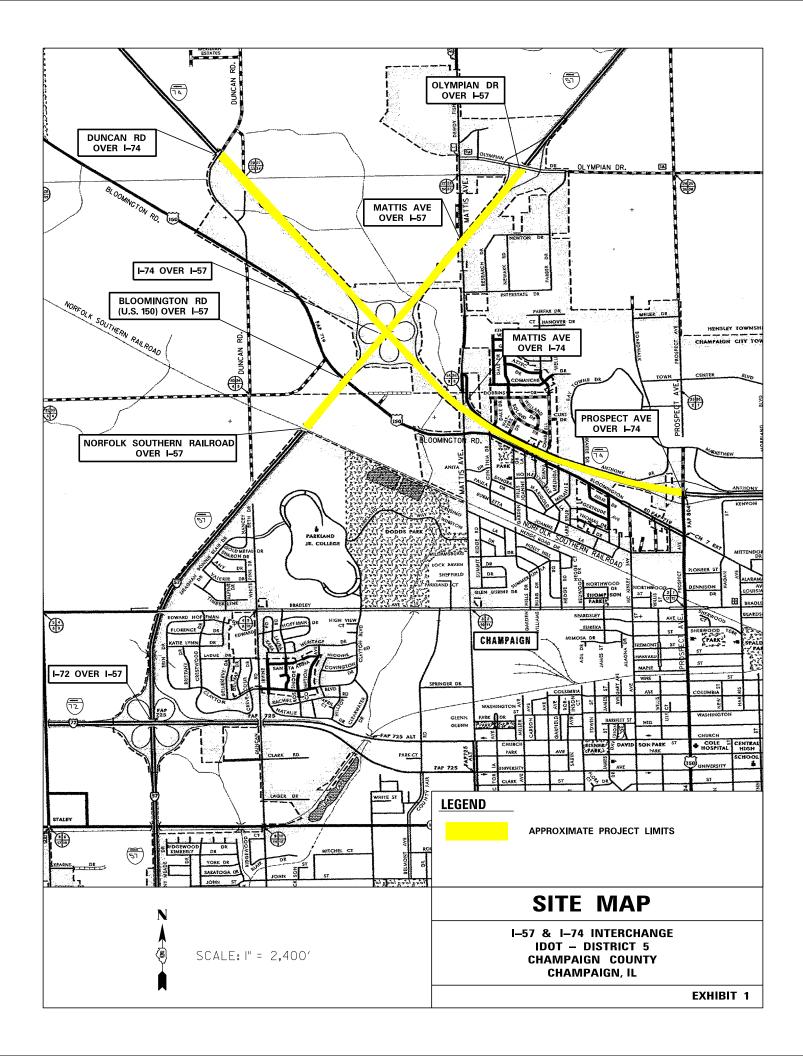
The recommended pavement design for Mattis Avenue over I-57 is a flexible pavement with a thickness of 9.25 inches and full depth HMA shoulders:

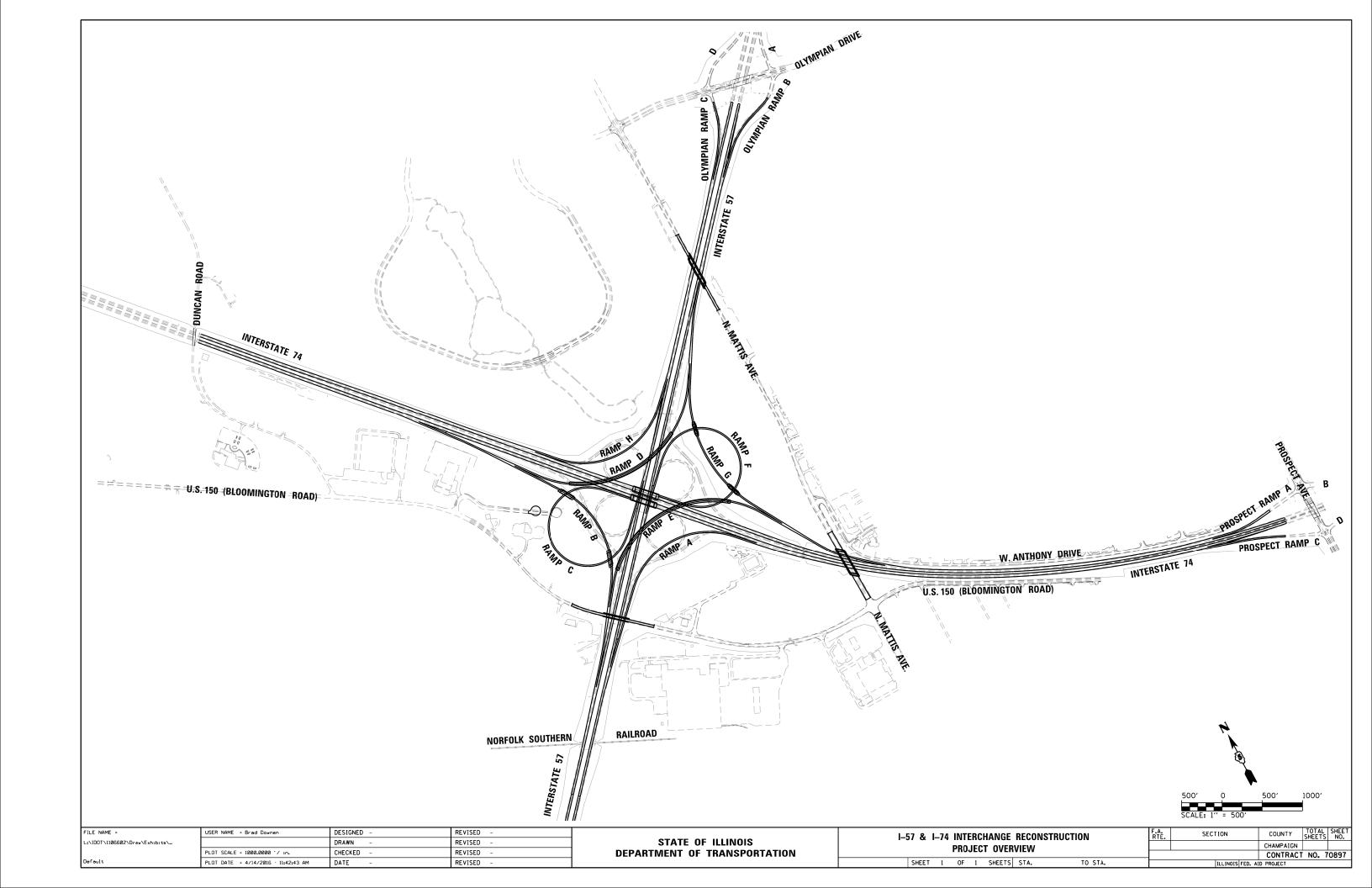
Lane Pavement

- HMA Pavement (Full-Depth), 9.25"
 - o Polymerized HMA Surface Course, Mix "D", N70, 2" (IL-9.5, SBS PG 64-28)
 - o Polymerized HMA Binder Course, IL-19.0, N70, 2.25" (SBS PG 64-28)
 - o HMA Binder Course, IL-19.0, N70, 5" (PG 64-22)
- Subbase Granular Material Type A, 12"

Shoulder Pavement

- HMA Shoulders, 9.25"
 - o HMA Surface Course, Mix "C", N50, 2" (PG 64-22)
 - HMA Binder Course, IL-19.0, N50, 7.25" (PG 64-22)
- Subbase Granular Material Type A, 12"





IDOT MECHANISTIC PAVEMENT DESIGN BDE 5401 Template (Rev. 09/05/2013) Printed: 06/30/2017 PROJECT AND TRAFFIC INPUTS (Enter Data in Gray Shaded Cells) Route: Mattis Ave over I-57 Comments: Section: (10-34HB-3)BR&(10-5-1HB)BR-1 County: Champaign 06/30/2017 CMT <-- BY Design Date: <-- BY Location: Champaign, IL Modify Date: ADT Year Current Facility Type Unmarked State Route Future 2 or 3 # of Lanes = Structural Design Traffic Part of future 4 lanes or more ? No One Way Street ? Minimum Actual Actual %of % of ADT in Road Class: Ш ADT ADT Total ADT Design Lane PV = No Min 7,527 91.9% Poor No Min 4.3% 50% Subgrade Support Rating (SSR): SU = 352 S= 3.8% 50% 2020 Construction Year: MU = No Min 311 M = Design Period (DP) = 20 Struct. Design ADT = 8,190 (2030) TRAFFIC FACTOR CALCULATION **FLEXIBLE PAVEMENT RIGID PAVEMENT** Cpv = 0.15 Cpv = 0.15 Csu = 112.06 Csu = 135.78

	NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS											
	Full-De	JP	C Pavem	ent								
	Use TF flexible =	1.61		Use TF rigid =	2.25							
	PG Grade Lower Binder Lifts =	PG 64-22	(Fig. 53-4.R)	Edge Support =	Tied	Shoulder or C.&G.						
Goto Map	HMA Mixture Temp. =	77.5	deg. F (Fig. 54-5.C)	Rigid Pavt Thick. =	8.25	in. (Fig. 54-4.E)						
	Design HMA Mixture Modulus (E _{HMA}) =	620	ksi (Fig. 54-5.D)									
	Design HMA Strain (ϵ_{HMA}) =	105	(Fig. 54-5.E)		CRC Pave	ement						
	Full Depth HMA Design Thickness =	9.25	in. (Fig. 54-5.F)	Use TF rigid =	2.25							
Goto Map	Limiting Strain Criterion Thickness =	15.75	in. (Fig. 54-5.I)	IBR value =	3							
	Use Full-Depth HMA Thickness =	9.25	inches	CRCP Thickness =	7 00	in. (Fig. 54-4.N)						

(Actual ADT)

(Min ADT Fig. 54-2.C)

Cmu =

TF flexible (Actual) =

TF flexible (Min) =

385.44

1.61

No Min

TF MUST BE > 60 FOR CRCP

Cmu =

TF rigid (Min) = No Min

TF rigid (Actual) =

567.21

2.25

(Actual ADT) (Min ADT Fig. 54-2.C)

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS									
	HMA Overlay of Rubblized PCC	Unbonded Concrete Overlay							
Goto Map	Use TF flexible = 1.61 HMA Overlay Design Thickness = 6.50 in. (Fig. 54-5.) Limiting Strain Criterion Thickness = in. (Fig. 54-5.)	special considerations.							
	Use HMA Overlay Thickness = 999.00 inches	JPCP Thickness = NA inches							

Class I Roads		Class II Roads		C	lass III Road	ls	Class IV	Roa
4 lanes or more Part of a future 4 lanes or more One-way Streets with ADT > 3500		2 lanes with ADT > 2000 One way Street with ADT <= 3500				2 Lai (ADT <		
	Min. Str.	Design Traffic (Fig	54-2.C)			Class 1	Γable for	
Facility Type	PV	SU	MU			One-Wa	y Streets	
Interstate or Freeway	0	500	1500			ADT	Class	
Other Marked State Route Unmarked State Route	0 No Min	250 No Min	750 No Min			0 - 3500 >3501	11	
Class	Csu	Fig. 54-4.C) Cmu	Csu	ig. 54-5.B) Cmu		(not futur	B lanes e 4 lane &	
i u	143.81 135.78	696.42 567.21	132.50 112.06	482.53 385.44		not one-v ADT	vay street) Class	
iii	129.58	562.47	109.14	384.35		0 - 749	IV	
IV	129.58	562.47	109.14	384.35		750 - 2000	III	
	120.00	002.11	100.11	001.00		>2000	II	
	Design	Lane Distribution Fa	actors For Stru	ıctural Design	Traffic (Fig.	54-2.B)		
		Rural			Urban			
Number of Lanes	Р	S	М	Р	S	М		
1 Lane Ramp	100%	100%	100%	100%	100%	100%		
2 or 3	50%	50%	50%	50%	50%	50%		
4	32%	45%	45%	32%	45%	45%		
6 or more	20%	40%	40%	8%	37%	37%		

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA PAVEMENT Standard Design

ROUTE Mattis Ave over I-57

SECTION (10-34HB-3)BR&(10-5-1HB)BR-1

COUNTY Champaign LOCATION Champaign, IL

FACILITY TYPE NON-INTERSTATE

PROJECT LENGTH 271 FT ==> 0.05 Miles

OF CENTERLINES 1 CL # OF LANES 2 LANES # OF EDGES 2 EP LANE WIDTH - AVERAGE 12 FT 8 FT SHOULDER WIDTH HMA Left HMA 8 FT Right Total Width of Paved Shoulders 16 FT

PAVEMENT THICKNESS (FLEXIBLE)

9.25 IN

15.75 IN MAX

SHOULDER THICKNESS

9.25 IN

HMA_SD

Standard Design

POLICY OVERLAY THICKNESS 2.25 IN

FLEX PAVEMENT TRAFFIC FACTORS MINIMUM ACTUAL USE

No Min 1.61 1.61

Read Me!

HMA COST PER TON
HMA SURFACE
HMA TOP BINDER
HMA LOWER BINDER
HMA BINDER (LEVELING)
HMA SHOULDER

UNIT PRICE
\$96.98 / TON
\$96.98 / TON
\$91.29 / TON
\$91.29 / TON
\$101.02 / TON

INITIAL COSTS

ITEM **THICKNESS** 100% QUAIUNIT UNIT PRICE COST HMA PAVEMENT (FULL-DEPTH) 723 723 SQ YD \$50.18 / SQ YD \$36,264 ~ (9.25")82 TONS HMA SURFACE COURSE (2.00")1.0069 \$96.98 / TON \$0 HMA TOP BINDER COURSE \$0 (2.25")1.0217 93 TONS \$96.98 / TON HMA LOWER BINDER COURSE (5.00")**212 TONS** \$91.29 / TON \$0 1.0469 HMA SHOULDER (9.25")482 250 TONS \$101.02 / TON \$25,211 ~ 0 LIN FT **CURB & GUTTER** \$30.00 / LIN F7 \$0 SUBBASE GRAN MATL TY C (TONS) 0 TONS \$25.00 / TON \$0 Aggregate Width = 42.5 IMPROVED SUBGRADE: 1,281 SQ YD \$0.00 / SQ YD \$0 Reserved For User Supplied Item 0 UNITS \$0.00 / UNITS \$0 Reserved For User Supplied Item \$0.00 / UNITS \$0 0 UNITS

Note: * Denotes User Supplied Quantity FLEXIBLE CONSTRUC \$61,475

723 SQ YD

482 SQ YD

\$0.00 / SQ YD

\$0.00 / SQ YD

FLEXIBLE CONSTRUC

\$0

\$0

\$48,850

.. ,

PAVEMENT REMOVAL

SHOULDER REMOVAL

MAINTENANCE COSTS:
ITEM THICKNESS MATERIAL T UNIT COST

ROUTINE MAINTENANCE ACTIVITY \$0.00 LANE-MILE / YEAR

HMA OVERLAY PVMT SURF (2.00")1.0069 Surface N 2.00 \$10.94 / SQ YD \$12.07 / SQ YD HMA OVERLAY PVMT (2.25")1.0078 2.25 \$8.19 / SQ YD HMA SURFACE MIX (1.50")1.0052 Surface N 1.50 HMA BINDER MIX (0.75")1.0130 Leveling Bind \$3.88 / SQ YD 0.75 \$12.73 / SQ YD HMA OVERLAY SHLD (2.25")Shoulder 2.25 (Year 30) HMA OVERLAY SHLD (2.00")Shoulder 2.00 \$11.31 / SQ YD \$3.00 / SQ YD MILLING (2.00 IN) 2.00 PARTIAL DEPTH PVMT PATCH (Mill & Fill Surf) Surface N 2.00 \$80.86 / SQ YD PARTIAL DEPTH SHLD PATCH (Mill & Fill Surf) Shoulder 2.00 \$81.31 / SQ YD

PARTIAL DEPTH PVMT PATCH (Mill & Fill +2.00 ") Leveling Binc 2.00 \$80.22 / SQ YD PARTIAL DEPTH SHLD PATCH (Mill & Fill +2.00 ") Shoulder 2.00 \$81.31 / SQ YD LONGITUDINAL SHOULDER JOINT ROUT & SEAL \$2.00 / LIN FT RANDOM / THERMAL CRACK ROUT & SEAL (100% Ref \$2.00 / LIN FT

FLEXIBLE TOTAL LIFE \$88,935 FLEXIBLE TOTAL ANN \$70,671 PCC PAVEMENT JPCP

ROUTE Mattis Ave over I-57

SECTION (10-34HB-3)BR&(10-5-1HB)BR-1

COUNTY Champaign LOCATION Champaign, IL

FACILITY TYPE NON-INTERSTATE

PROJECT LENGTH

OF CENTERLINES

1 CL

OF LANES

OF EDGES

271 FT ==> 0.05 Miles

1 CL

2 LANES

OF EDGES

LANE WIDTH - AVERAGE

SHOULDER WIDTH

PCC

Right

2 EP

12 FT

8 FT

8 FT

Total Width of Paved Shoulders

PAVEMENT THICKNESS (RIGID) JPCP 8.25 IN TIED SHLD

SHOULDER THICKNESS 8.25 IN

POLICY OVERLAY THICKNESS 2.50 IN

RIGID PAVEMENT TRAFFIC FACTOR	RS	MINIMUM No Min		ACTUAL 2.25		USE	2.25
Worksheet Construction Type is	Reconstruction	TTO WIII		The Pavement		JPCP	2.20
INITIAL COSTS ITEM	THICKNESS	100% QUA	NIT	UNIT PRICE		cos	Т
JPC PAVEMENT PAVEMENT REINFORCEMENT STABILIZED SUBBASE	(8.25") (4.00")	0	SQ YD SQ YD SQ YD	\$22.00	/ SQ YE / SQ YE / SQ YE		3,844 \$0 3,737
PCC SHOULDERS CURB & GUTTER	(8.25" to 8.25")		SQ YD LIN FT		/ SQ YC	-	9,280 \$0
SUBBASE GRAN MATL TY C IMPROVED SUBGRADE:	(~ 2.85") Aggregate Width = 41.0		TONS * SQ YD	\$25.00 \$0.00	/ TON / SQ YD	I	\$0 \$0
Stabilized Subbase for Full Depth Should Reserved For User Supplied Item	ders		SQ YD * UNITS	·	/ SQ YE / UNITS		9,730 \$0
PAVEMENT REMOVAL SHOULDER REMOVAL			SQ YD SQ YD		/ SQ YE		\$0 \$0
Note: * Denotes User Supplied Quantity	У			RIGID CONSTI		•	6,591 0,862

16 FT

MAINTENANCE COSTS:

ITEM

ROUTINE MAINTENANCE ACTIVITY \$0.00 / LANE-MILE / YEAR

HMA POLICY OVERLAY (2.50") 2.50

HMA POLICY OVERLAY PVMT (2.50") 1.0087 2.50 \$13.37 / SQ YD

MATERIAL T

UNIT COST

\$8.19 / SQ YD HMA SURFACE MIX (1.50")1.0052 Surface N 1.50 (1.00")1.0139 Leveling Binc 1.00 \$5.18 / SQ YD HMA BINDER MIX \$14.14 / SQ YD HMA POLICY OVERLAY SHLD (2.50")Shoulder 2.50 CLASS A PAVEMENT PATCHING \$300.00 / SQ YD **CLASS B PAVEMENT PATCHING** \$275.00 / SQ YD CLASS C SHOULDER PATCHING \$145.00 / SQ YD

THICKNESS

PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf)
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")
Surface N 1.50 \$78.15 / SQ YD
Surface N 2.50 \$83.58 / SQ YD

LONGITUDINAL SHOULDER JOINT ROUT & SEAL

CENTERLINE JOINT ROUT & SEAL

REFLECTIVE TRANSVERSE CRACK ROUT & SEAL

RANDOM CRACK ROUT & SEAL

(100% Rehab = 100.00' / \$2.00 / LIN FT

RIGID TOTAL LIFE-C \$96,079 RIGID TOTAL ANNUAL \$76,348

LIFE-CYCLE COST ANALYSIS: NEW DESIGN	Calculated / Re' ######
LII L'OTOLL COST ANALTSIS. INLIV DESIGN	

		JPC	P	HMA		
CONSTRUCTION	INITIAL COST	PRESENT '	\$76,591		\$61,475	
		ANNUAL C	\$60,862		\$48,850	
	LIFE CYCLE COST	DDECENT	640 400		07.400	
MAINTENANCE	LIFE-CYCLE COST	PRESENT '	\$19,488		\$27,460	
		ANNUAL C	\$15,486		\$21,821	
TOTAL	LIFE-CYCLE COST	PRESENT '	\$96,079		\$88,935	
TOTAL	Ell E OTOLE GOOT	ANNUAL C	\$76,348		\$70,671	
			. ,		,	
LIFE-CYCLE COST	ANALYSIS: FINAL SUMMARY					
LOWEST COST OP	TION	====== HM	A		\$70,671	
OTHER OPTIONS (L	LOWEST TO HIGHEST):	TYPE / PEJPO	CP .		\$76,348	8.0%

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FULL-DEPTH HMA PAVEMENT HMA OVERLAY OF RUBBLIZED PCC PAVEMENT Figure 54-7.C STANDARD DESIGN

		OTANDAN	DEGIGIN				PRESENT
MAINTEN	JAN(ITEM	%	QUANTITY	UNIT	UNIT COST	COST	WORTH
YEAR	5						
	LONG SHLD JT R&S	100.00%	542	LIN FT	\$2.00	\$1,084	
	CNTR LINE JOINT R&S	100.00%		LIN FT	\$2.00	\$542	
	RNDM / THRM CRACK R&S	50.00%		LIN FT	\$2.00	\$596	
	PD PVMT PATCH M&F SURF	0.10%		SQ YD	\$80.86	\$81	
	PWFn =	0.8626		PW =	0.8626 X	\$2,303	\$1,987
YEAR	10						
ILAN	LONG SHLD JT R&S	100.00%	542	LIN FT	\$2.00	\$1,084	
	CNTR LINE JOINT R&S	100.00%		LIN FT	\$2.00	\$542	
	RNDM / THRM CRACK R&S	50.00%		LIN FT	\$2.00	\$596	
	PD PVMT PATCH M&F SURF	0.50%		SQ YD	\$80.86	\$323	
	PWFn =	0.7441	•	PW =	0.7441 X	\$2,545	\$1,894
		3			3	ΨΞ,0 .0	ψ.,σσ.
YEAR	15	400.000/	4 004	00 VD	Фо оо	Ф0 040	
	MILL PVMT & SHLD 2.00"	100.00%	•	SQ YD	\$3.00	\$3,612	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%		SQ YD	\$80.22	\$562	
	HMA OVERLAY PVMT 2.00"	100.00%		SQ YD	\$10.94	\$7,904	
	HMA OVERLAY SHLD 2.00 "	100.00%	482	SQ YD	\$11.31	\$5,451	D44.054
	PWFn =	0.6419		PW =	0.6419 X	\$17,529	\$11,251
YEAR	20						
	LONG SHLD JT R&S	100.00%	542	LIN FT	\$2.00	\$1,084	
	CNTR LINE JOINT R&S	100.00%	271	LIN FT	\$2.00	\$542	
	RNDM / THRM CRACK R&S	50.00%	298	LIN FT	\$2.00	\$596	
	PD PVMT PATCH M&F SURF	0.10%	1	SQ YD	\$80.86	\$81	
	PWFn =	0.5537		PW =	0.5537 X	\$2,303	\$1,275
YEAR	25						
1 = / (1)	LONG SHLD JT R&S	100.00%	542	LIN FT	\$2.00	\$1,084	
	CNTR LINE JOINT R&S	100.00%		LIN FT	\$2.00	\$542	
	RNDM / THRM CRACK R&S	50.00%		LIN FT	\$2.00	\$596	
	PD PVMT PATCH M&F SURF	0.50%		SQ YD	\$80.86	\$323	
	PWFn =	0.4776	7	PW =	0.4776 X	\$2,545	\$1,216
	HMA_SD	0.4770		1 VV —	0.4770 X	Ψ2,040	Ψ1,210
YEAR	30 NON-INTERSTATE						
	MILL PVMT & SHLD 2.00"	100.00%	1,204	SQ YD	\$3.00	\$3,612	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	14	SQ YD	\$80.22	\$1,123	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	5	SQ YD	\$81.31	\$407	
	HMA OVERLAY PVMT 2.25 "	100.00%	723	SQ YD	\$12.07	\$8,725	
	HMA OVERLAY SHLD 2.25 "	100.00%	482	SQ YD	\$12.73	\$6,132	
	PWFn =	0.4120		PW =	0.4120 X	\$19,999	\$8,239
YEAR	35						
ILAN	LONG SHLD JT R&S	100.00%	542	LIN FT	\$2.00	\$1,084	
	CNTR LINE JOINT R&S	100.00%		LIN FT	\$2.00	\$542	
	RNDM / THRM CRACK R&S	50.00%		LIN FT	\$2.00	\$596	
	PD PVMT PATCH M&F SURF	0.10%		SQ YD	\$80.86	\$81	
	PWFn =	0.3554	'	PW =	0.3554 X	\$2,303	\$818
	1 WI II =	0.5554		1 VV —	0.5554 A	Ψ2,303	ψΟ1Ο
YEAR	40	400.000			A a a a a	* • • • •	
	LONG SHLD JT R&S	100.00%		LIN FT	\$2.00	\$1,084	
	CNTR LINE JOINT R&S	100.00%		LIN FT	\$2.00	\$542	
	RNDM / THRM CRACK R&S	50.00%		LIN FT	\$2.00	\$596	
	PD PVMT PATCH M&F SURF	0.50%	4	SQ YD	\$80.86	\$323	4
	PWFn =	0.3066		PW =	0.3066 X	\$2,545	\$780
							\$27,460
	ROUTINE MAINTENANCE ACTIVITY		0.10	Lane Miles	0.00	\$0	\$0
						MAINTENANC	. ,
	45 YEAR LIFE CYCLE CRFn :	= 0.0407852				MAINTENANC	E \$21,821

-

JOINTED PLAIN CONCRETE PAVEMENT UNBONDED JOINTED PLAIN CONCRETE OVERLAY Figure 54-7.A

MAINTENAN(ITEM	%	QUANTITY	UNIT	UNIT COST	COST	PRESENT WORTH
YEAR 10 PAVEMENT PATCH CLASS B PWFn =	0.10% 0.7441	1	SQ YD PW =	\$275.00 0.7441 X	\$275 \$275	\$205
YEAR 15 PAVEMENT PATCH CLASS B PWFn =	0.20% 0.6419	1	SQ YD PW =	\$275.00 0.6419 X	\$275 \$275	\$177
YEAR 20 PAVEMENT PATCH CLASS B SHOULDER PATCH CLASS C LONGITUDINAL SHLD JT R&S CENTERLINE JT R&S PWFn =	2.00% 0.50% 100.00% 100.00% 0.5537	2 542	SQ YD SQ YD LIN FT LIN FT PW =	\$275.00 \$145.00 \$2.00 \$2.00 0.5537 X	\$3,850 \$290 \$1,084 \$542 \$5,766	\$3,192
YEAR 25 PAVEMENT PATCH CLASS B SHOULDER PATCH CLASS C PWFn =	3.00% 1.00% 0.4776		SQ YD SQ YD PW =	\$275.00 \$145.00 0.4776 X	\$6,050 \$725 \$6,775	\$3,236
YEAR 30 NON-INTERSTATE PAVEMENT PATCH CLASS B SHOULDER PATCH CLASS C HMA POLICY OVERLAY 2.5" (PVM) HMA POLICY OVERLAY 2.5" (SHLE PWFn =	,	7 723	SQ YD SQ YD SQ YD SQ YD PW =	\$275.00 \$145.00 \$13.37 \$14.14 0.4120 X	\$7,975 \$1,015 \$9,664 \$6,814 \$25,468	\$10,492
YEAR 35 NON-INTERSTATE LONGITUDINAL SHLD JT R&S CENTERLINE JT R&S RANDOM CRACK R&S REFLECTIVE TRANSVERSE CRACK PD PVMT PATCH M&F HMA 2.50" PWFn =	100.00% 100.00% 50.00% R&S 40.00% 0.10% 0.3554	271 271 173	LIN FT LIN FT LIN FT LIN FT SQ YD PW =	\$2.00 \$2.00 \$2.00 \$2.00 \$83.58 0.3554 X	\$1,084 \$542 \$542 \$346 \$84 \$2,598	\$923
YEAR 40 NON-INTERSTATE PAVEMENT PATCH CLASS B LONGITUDINAL SHLD JT R&S CENTERLINE JT R&S REFLECTIVE TRANSVERSE CRACK RANDOM CRACK R&S PD PVMT PATCH M&F HMA 2.50" PWFn =	0.50% 100.00% 100.00% R&S 60.00% 50.00% 0.50% 0.3066	542 271 259 271 4	SQ YD LIN FT LIN FT LIN FT LIN FT SQ YD PW =	\$275.00 \$2.00 \$2.00 \$2.00 \$2.00 \$83.58 0.3066 X	\$1,100 \$1,084 \$542 \$518 \$542 \$334 \$4,120	\$1,263 \$19,488
ROUTINE MAINTENANCE ACTIVITY 45 YEAR LIFE CYCLE CRFn	= 0.0407852	0.10	Lane Miles	\$0.00	\$0 MAINTENANC MAINTENANC	E \$19,488

BDE 5401 Template (Rev. 09/05/2013)					
Printed: 06/30/2017 Lifecycle =	45 Years Interest Rate = 3.00%	Standard Surface Thickness =	2.00 IN		
		HMA Surface (New Pavement)	2.00 IN	Thermal / Random Crack Route & Seal	110 FT / Sta / Lane
		,			
		HMA Top Binder Course	2.25 IN	Random Crack Route & Seal	100 FT / Sta / Lane
		HMA Lower Binder Course	5.00 IN	Patching: Additional Labor Cost = \$	67.00 / SQ YD
Standard Pavement Slope =	-0.01563 FT/FT				
Standard Shoulder Slope =	-0.04167 FT/FT	HMA Policy Overlay for LSCD	2.00 IN		
Tied PCC Shoulder Outside Edge Thickness =	8.25 IN Outside Edge ShldT = 8.25 IN				
Standard Stabilized Subbase Thickness =	Standard Stabilized Subbase Thickness = 4.00 IN <=== (See Dark Orange Color in Diagrams Below) Int		3.75 IN		
Standard Pavement Subbase Outhang =	0.00 FT <=== (See Dark Orange Color in Diagrams Below)	Surface	1.50 IN		
Standard Shoulder Subbase Outhang =	6.00 IN <=== (See Yellow Color in Diagrams Below)	Top Binder Mix	2.25 IN		
			Over HMA Over P	PCC	
Standard Foreslope =	4 :1 FT/FT	Non-Interstate HMA Policy Overlay	2.25 IN 2	2.50 IN	
Standard Wedge =	1 :1 FT/FT	Surface	1.50 IN 1	1.50 IN	
(PCC Pavement) Shoulder Wedge =	0.0001 :1 FT/FT	WorkSheet Setting Leveling Binder Mix	0.75 IN 1	1.00 IN	Mirror
		Standard Design			LSC Design
Standard Surface & Binder SW =	2.01600 TONS / CU YD ==> 112.0 LB per SQYD IN	HMA_SD HMA Policy Overlay	2.25 IN 2	2.50 IN 2.00 IN HM	IA Policy Overlay HMA_LSCD
Standard Shoulder Subbase SW =	2.05000 TONS / CU YD ==> 113.9 LB per SQYD IN	NON-INTERSTATE Surface	1.50 IN 1	1.50 IN 2.00 IN Su	rface NON-INTERSTATE
		Leveling Binder Mix	0.75 IN 1	1.00 IN 0.00 IN Lev	/eling Binder Mix

IDOT MECHANISTIC PAVEMENT DESIGN

Printed: 06/30/2017 PROJECT AND TRAFFIC INPUTS (Enter Data in Gray Shaded Cells) Route: Mattis Avenue over I-74 Comments: Section: (10-34HB-3)BR&(10-5-1HB)BR-1 Design Date: CMT <-- BY County: Champaign 06/30/2017 Location: Champaign, IL <-- BY Modify Date: ADT Year Current Facility Type Unmarked State Route Future # of Lanes = Structural Design Traffic Minimum Actual %of % of ADT in Actual Road Class: ADT ADT Total ADT Design Lane PV = No Min 16,625 95.0% Poor 4.2% 45% Subgrade Support Rating (SSR): SU = No Min 735 S= 45% 2020 0.8% Construction Year: MU = No Min 140 M = Design Period (DP) = 20 Struct. Design ADT = 17,500 (2030) TRAFFIC FACTOR CALCULATION **FLEXIBLE PAVEMENT RIGID PAVEMENT** Cpv = 0.15 Cpv = 0.15 Csu = 132.5 Csu = 143.81 Cmu = 482.53 Cmu = 696.42 TF flexible (Actual) = 1.50 (Actual ADT) TF rigid (Actual) = 1.84 (Actual ADT)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS						
	Full-Depth HMA Pavement			JP	C Paveme	ent
	Use TF flexible = 1.50			Use TF rigid =	1.84	
	PG Grade Lower Binder Lifts =	PG 64-22	(Fig. 53-4.R)	Edge Support =	Tied	Shoulder or C.&G.
Goto Map	HMA Mixture Temp. =	77.5	deg. F (Fig. 54-5.C)	Rigid Pavt Thick. =	8.25	in. (Fig. 54-4.E)
	Design HMA Mixture Modulus (E _{HMA}) =	620	ksi (Fig. 54-5.D)			
	Design HMA Strain (ϵ_{HMA}) =	107	(Fig. 54-5.E)	(CRC Pave	ment
	Full Depth HMA Design Thickness =	9.25	in. (Fig. 54-5.F)	Use TF rigid =	1.84	
Goto Map	Limiting Strain Criterion Thickness =	15.75	in. (Fig. 54-5.I)	IBR value =	3	
	Use Full-Depth HMA Thickness =	9.25	inches	CRCP Thickness =	7.00	in. (Fig. 54-4.M)

(Min ADT Fig. 54-2.C)

TF MUST BE > 60 FOR CRCP

No Min

(Min ADT Fig. 54-2.C)

TF rigid (Min) =

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS				
HMA Overlay of Rubblized PCC			Unbonded Concrete Overlay	
	Use TF flexible =	1.50		D : 54.400 (1.11 1.11
	HMA Overlay Design Thickness =	6.50	in. (Fig. 54-5.U)	Review 54-4.03 for limitations and special considerations.
Goto Map	Limiting Strain Criterion Thickness =	11.25	in. (Fig. 54-5.V)	opodal conductations.
	Use HMA Overlay Thickness =	6.50	inches	JPCP Thickness = NA inches

CONTACT BMPR FOR ASSISTANCE

DESIGN TABLES FROM BDE MANUAL CHAPTER 54 - PAVEMENT DESIGN

Class I Roads	Class II Roads	Class III Roads	Class IV Roads
4 lanes or more	2 lanes with ADT > 2000	2 Lanes	2 Lanes
Part of a future 4 lanes or more	One way Street with ADT <= 3500	(ADT 750 -2000)	(ADT < 750)
One-way Streets with ADT > 3500			

Min. Str. Design Traffic (Fig 54-2.C)				
Facility Type	PV	SU	MU	
Interstate or Freeway	0	500	1500	
Other Marked State Route	0	250	750	
Unmarked State Route	No Min	No Min	No Min	

TF flexible (Min) =

No Min

	Traffic Factor ESAL Coefficients				
	Rigid (Flexible (F	ig. 54-5.B)		
Class	Csu	Cmu	Csu	Cmu	
I	143.81	696.42	132.50	482.53	
II	135.78	567.21	112.06	385.44	
III	129.58	562.47	109.14	384.35	
IV	129.58	562.47	109.14	384.35	

Class Table for				
One-Way Streets				
ADT	Class			
0 - 3500	II			
>3501				

Class Table for			
2 or 3	3 lanes		
(not futur	e 4 lane &		
not one-v	vay street)		
ADT	Class		
0 - 749	IV		
750 - 2000 III			
>2000	II.		

	Design Lane Distribution Factors For Structural Design Traffic (Fig. 54-2.B)						
		Rural Urban					
Number of Lanes	P S M P S						
1 Lane Ramp	100%	100%	100%	100%	100%	100%	
2 or 3	50%	50%	50%	50%	50%	50%	
4	32%	45%	45%	32%	45%	45%	
6 or more	20%	40%	40%	8%	37%	37%	

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA PAVEMENT Standard Design

ROUTE Mattis Avenue over I-74 SECTION (10-34HB-3)BR&(10-5-1HB)BR-1

COUNTY Champaign LOCATION Champaign, IL

FACILITY TYPE NON-INTERSTATE

PROJECT LENGTH 273 FT ==> 0.05 Miles

OF CENTERLINES 1 CL # OF LANES 4 LANES # OF EDGES 2 EP LANE WIDTH - AVERAGE 12 FT 4 FT SHOULDER WIDTH HMALeft 4 FT HMA Right Total Width of Paved Shoulders 8 FT

PAVEMENT THICKNESS (FLEXIBLE)

9.25 IN

SHOULDER THICKNESS

9.25 IN

HMA_SD

Standard Design

POLICY OVERLAY THICKNESS 2.25 IN

FLEX PAVEMENT TRAFFIC FACTORS MINIMUM ACTUAL USE

No Min 1.50 1.50

Read Me!

HMA COST PER TON
HMA SURFACE
HMA TOP BINDER
HMA LOWER BINDER
HMA BINDER (LEVELING)
HMA SHOULDER

UNIT PRICE
\$96.98 / TON
\$96.98 / TON
\$91.29 / TON
\$91.29 / TON
\$101.02 / TON

INITIAL COSTS

ITEM **THICKNESS** 100% QUAIUNIT UNIT PRICE COST HMA PAVEMENT (FULL-DEPTH) 1456 1,456 SQ YD \$49.41 / SQ YD \$71,944 ~ (9.25")**164 TONS** HMA SURFACE COURSE (2.00")1.0035 \$96.98 / TON \$0 \$0 HMA TOP BINDER COURSE (2.25")1.0109 **185 TONS** \$96.98 / TON HMA LOWER BINDER COURSE (5.00")1.0234 **417 TONS** \$91.29 / TON \$0 HMA SHOULDER (9.25")243 **126 TONS** \$101.02 / TON \$12,698 ~ **CURB & GUTTER** 1,146 LIN FT * \$30.00 / LIN F7 \$34,380 SUBBASE GRAN MATL TY C (TONS) 0 TONS \$25.00 / TON \$0 Aggregate Width = 58.5 IMPROVED SUBGRADE: 1,776 SQ YD \$0.00 / SQ YD \$0 Reserved For User Supplied Item 0 UNITS \$0.00 / UNITS \$0 Reserved For User Supplied Item \$0.00 / UNITS \$0 0 UNITS PAVEMENT REMOVAL 1,456 SQ YD \$0.00 / SQ YD \$0 SHOULDER REMOVAL \$0.00 / SQ YD 243 SQ YD \$0

Note: * Denotes User Supplied Quantity FLEXIBLE CONSTRUC \$119,022 FLEXIBLE CONSTRUC \$93,886

MATERIAL T

UNIT COST

MAINTENANCE COSTS:

ITEM

THICKNESS

ROUTINE MAINTENANCE ACTIVITY \$0.00 LANE-MILE / YEAR

HMA OVERLAY PVMT SURF (2.00")1.0035 Surface N 2.00 \$10.90 / SQ YD \$12.03 / SQ YD HMA OVERLAY PVMT (2.25")1.0039 2.25 \$8.17 / SQ YD HMA SURFACE MIX (1.50")1.0026 Surface N 1.50 \$3.86 / SQ YD HMA BINDER MIX (0.75")1.0065 Leveling Bind 0.75 \$12.73 / SQ YD HMA OVERLAY SHLD (2.25")Shoulder 2.25 (Year 30) HMA OVERLAY SHLD (2.00")Shoulder 2.00 \$11.31 / SQ YD \$3.00 / SQ YD MILLING (2.00 IN) 2.00 PARTIAL DEPTH PVMT PATCH (Mill & Fill Surf) Surface N 2.00 \$80.86 / SQ YD PARTIAL DEPTH SHLD PATCH (Mill & Fill Surf) Shoulder 2.00 \$81.31 / SQ YD

PARTIAL DEPTH PVMT PATCH	(Mill & Fill +2.00 ")	Leveling Bind	2.00	\$80.22	/ SQ YD
PARTIAL DEPTH SHLD PATCH	(Mill & Fill +2.00 ")	Shoulder	2.00	\$81.31	/ SQ YD
LONGITUDINAL SHOULDER JOINT F	ROUT & SEAL			\$2.00	/ LIN FT
CENTERLINE JOINT ROUT & SEAL				\$2.00	/ LIN FT
RANDOM / THERMAL CRACK ROUT	& SEAL	(1	100% Reh	\$2.00	/ LIN FT

FLEXIBLE TOTAL LIFE \$157,008 FLEXIBLE TOTAL ANN \$123,850

JPCP PCC PAVEMENT

ROUTE Mattis Avenue over I-74 **SECTION** (10-34HB-3)BR&(10-5-1HB)BR-1 COUNTY Champaign

Champaign, IL LOCATION

FACILITY TYPE NON-INTERSTATE

PROJECT LENGTH 273 FT ==> 0.05 Miles # OF CENTERLINES 1 CL # OF LANES 4 LANES # OF EDGES 2 EP LANE WIDTH - AVERAGE 12 FT

SHOULDER WIDTH PCC Left 4 FT PCC Right 4 FT **Total Width of Paved Shoulders** 8 FT

PAVEMENT THICKNESS (RIGID) **JPCP** 8.25 IN **TIED SHLD**

SHOULDER THICKNESS 8.25 IN

POLICY OVERLAY THICKNESS 2.50 IN

RIGID PAVEMENT TRAFFIC FACTOR	RS	MINIMUM No Min		ACTUAL 1.84		SE 1.84	
Worksheet Construction Type is	Reconstruction			The Pavement			
INITIAL COSTS ITEM	THICKNESS	100% QU <i>A</i>	TINU	UNIT PRICE		COST	
JPC PAVEMENT PAVEMENT REINFORCEMENT STABILIZED SUBBASE	(8.25") (4.00")	0	SQ YD SQ YD SQ YD	\$22.00	/ SQ YD / SQ YD / SQ YD	\$68,155 \$0 \$27,664	
PCC SHOULDERS CURB & GUTTER	(8.25" to 8.25")	243	SQ YD LIN FT *	\$40.00	/ SQ YD / LIN F	\$9,720 \$34,380	
SUBBASE GRAN MATL TY C IMPROVED SUBGRADE:	(~ 3.78") Aggregate Width = 57.0		TONS * SQ YD	\$25.00 \$0.00	/ TON / SQ YD	\$0 \$0	
Stabilized Subbase for Full Depth Should Reserved For User Supplied Item	lers		SQ YD * UNITS	•	/ SQ YD / UNITS	\$5,193 \$0	
PAVEMENT REMOVAL SHOULDER REMOVAL		•	SQ YD SQ YD	· ·	/ SQ YD / SQ YD	\$0 \$0	
Note: * Denotes User Supplied Quantity	/			RIGID CONST		\$145,112 \$114,466	

MAINTENANCE COSTS:

ITEM THICKNESS MATERIAL T UNIT COST ROUTINE MAINTENANCE ACTIVITY \$0.00 / LANE-MILE / YEAR HMA POLICY OVERLAY 2.50 (2.50")\$13.32 / SQ YD HMA POLICY OVERLAY PVMT (2.50")1.0043 2.50 Surface N \$8.17 / SQ YD HMA SURFACE MIX (1.50")1.0026 1.50 HMA BINDER MIX (1.00")1.0069 Leveling Bind 1.00 \$5.15 / SQ YD \$14.14 / SQ YD HMA POLICY OVERLAY SHLD (2.50")Shoulder 2.50 CLASS A PAVEMENT PATCHING \$300.00 / SQ YD **CLASS B PAVEMENT PATCHING** \$275.00 / SQ YD CLASS C SHOULDER PATCHING \$145.00 / SQ YD PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf) Surface N 1.50 \$78.15 / SQ YD PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50") Surface N 2.50 \$83.58 / SQ YD LONGITUDINAL SHOULDER JOINT ROUT & SEAL \$2.00 / LIN FT **CENTERLINE JOINT ROUT & SEAL** \$2.00 / LIN FT REFLECTIVE TRANSVERSE CRACK ROUT & SEAL \$2.00 / LIN FT RANDOM CRACK ROUT & SEAL (100% Rehab = 100.00' / \$2.00 / LIN FT

> RIGID TOTAL LIFE-C \$176,549 RIGID TOTAL ANNUAL \$139,264

LIFE-CYCLE COST ANALYSIS: NEW DESIGN	Calculated / Re' ######
LII L'OTOLL COST ANALTSIS. INLIV DESIGN	

		JP	CP	HMA	
CONSTRUCTION	INITIAL COST	PRESENT '	\$145,112	\$119,022	
		ANNUAL C	\$114,466	\$93,886	
MAINTENANCE	LIFE-CYCLE COST	PRESENT '	\$31,437	\$37,986	
MAINTENANCE	Ell E-GTOLL GOST	ANNUAL C	\$24,798	\$29,964	
		7 II VI VO / IL O	Ψ24,700	Ψ20,004	
TOTAL	LIFE-CYCLE COST	PRESENT '	\$176,549	\$157,008	
		ANNUAL C	\$139,264	\$123,850	
LIFE-CYCLE COST	ANALYSIS: FINAL SUMMARY				
LOWEST COST OP	TION	===== HN	МА	\$123,850	
OTHER OPTIONS (L	LOWEST TO HIGHEST):	TYPE / PEJP	CP	\$139,264	12.4%

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FULL-DEPTH HMA PAVEMENT HMA OVERLAY OF RUBBLIZED PCC PAVEMENT Figure 54-7.C STANDARD DESIGN

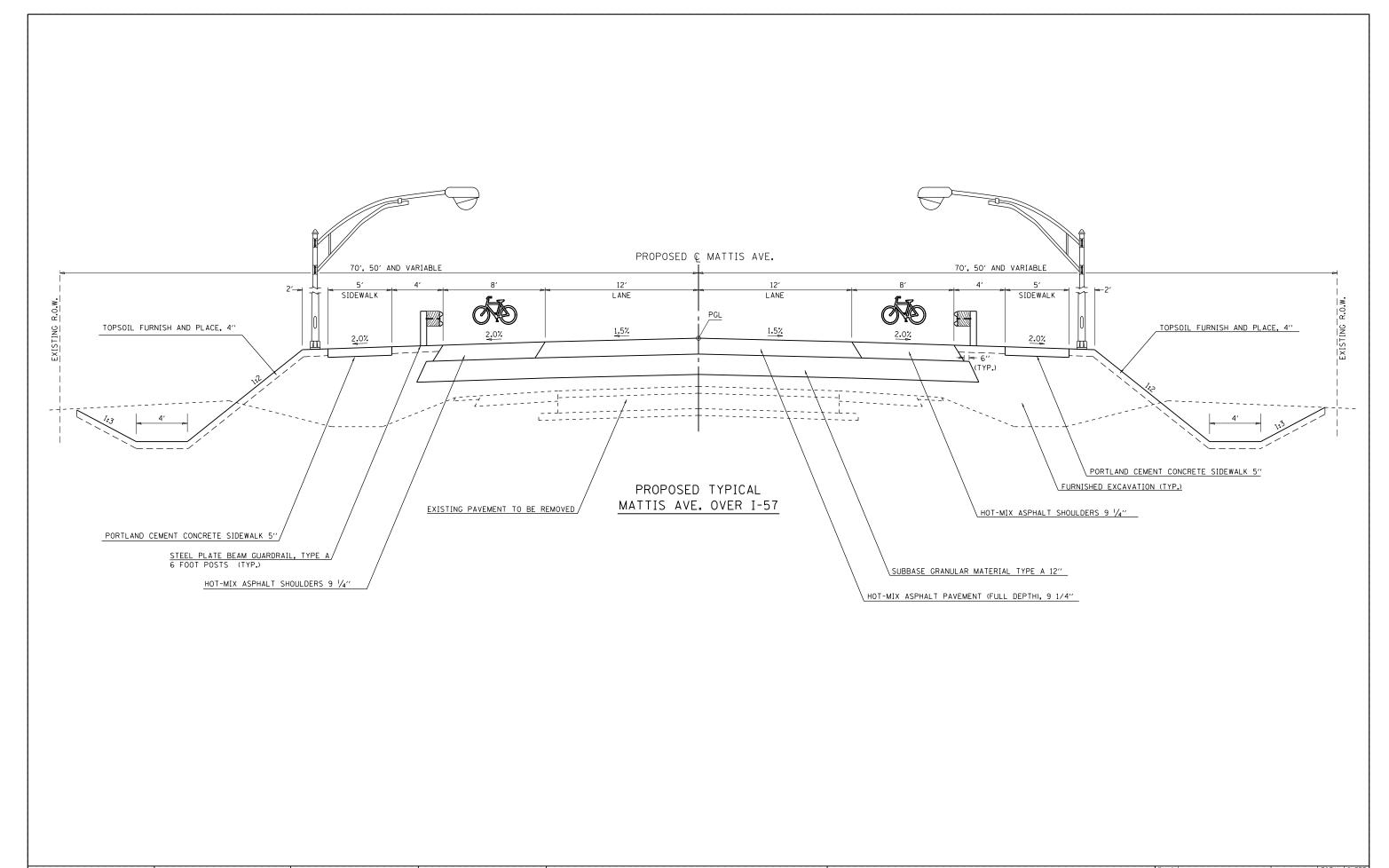
		OTANDAN	DESIGN				PRESENT
MAINTEN	IAN(ITEM	%	QUANTITY	UNIT	UNIT COST	COST	WORTH
YEAR	5						
	LONG SHLD JT R&S	100.00%	546	LIN FT	\$2.00	\$1,092	
	CNTR LINE JOINT R&S	100.00%		LIN FT	\$2.00	\$546	
	RNDM / THRM CRACK R&S	50.00%		LIN FT	\$2.00	\$1,202	
	PD PVMT PATCH M&F SURF	0.10%		SQ YD	\$80.86	\$81	
	PWFn =	0.8626	·	PW =	0.8626 X	\$2,921	\$2,520
YEAR	10						
ILAN	LONG SHLD JT R&S	100.00%	546	LIN FT	\$2.00	\$1,092	
	CNTR LINE JOINT R&S	100.00%		LIN FT	\$2.00	\$546	
	RNDM / THRM CRACK R&S	50.00%		LIN FT	\$2.00	\$1,202	
	PD PVMT PATCH M&F SURF	0.50%		SQ YD	\$80.86	\$566	
	PWFn =	0.7441	•	PW =	0.7441 X	\$3,406	\$2,534
\ -							
YEAR	15 MILL PVMT & SHLD 2.00"	100.00%	1 600	SQ YD	\$3.00	\$5,097	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%		SQ YD	\$80.22	\$1,203	
	HMA OVERLAY PVMT 2.00"	100.00%		SQ YD	\$10.90	\$15,870	
	HMA OVERLAY SHLD 2.00 "	100.00%	•	SQ YD	\$10.90 \$11.31	\$2,746	
	PWFn =	0.6419	243	PW =	о.6419 X	\$2,746 \$24,916	¢15 002
	PVVFII =	0.0419		PVV =	0.0419 X	\$24,910	\$15,993
YEAR	20						
	LONG SHLD JT R&S	100.00%		LIN FT	\$2.00	\$1,092	
	CNTR LINE JOINT R&S	100.00%		LIN FT	\$2.00	\$546	
	RNDM / THRM CRACK R&S	50.00%		LIN FT	\$2.00	\$1,202	
	PD PVMT PATCH M&F SURF	0.10%	1	SQ YD	\$80.86	\$81	
	PWFn =	0.5537		PW =	0.5537 X	\$2,921	\$1,617
YEAR	25						
	LONG SHLD JT R&S	100.00%	546	LIN FT	\$2.00	\$1,092	
	CNTR LINE JOINT R&S	100.00%	273	LIN FT	\$2.00	\$546	
	RNDM / THRM CRACK R&S	50.00%	601	LIN FT	\$2.00	\$1,202	
	PD PVMT PATCH M&F SURF	0.50%	7	SQ YD	\$80.86	\$566	
	PWFn =	0.4776		PW =	0.4776 X	\$3,406	\$1,627
	HMA_SD						
YEAR	30 NON-INTERSTATE				• • • •	.	
	MILL PVMT & SHLD 2.00"	100.00%	•	SQ YD	\$3.00	\$5,097	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%		SQ YD	\$80.22	\$2,327	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%		SQ YD	\$81.31	\$163	
	HMA OVERLAY PVMT 2.25 "	100.00%		SQ YD	\$12.03	\$17,511	
	HMA OVERLAY SHLD 2.25 "	100.00%	243	SQ YD	\$12.73	\$3,089	
	PWFn =	0.4120		PW =	0.4120 X	\$28,187	\$11,613
YEAR	35						
	LONG SHLD JT R&S	100.00%	546	LIN FT	\$2.00	\$1,092	
	CNTR LINE JOINT R&S	100.00%	273	LIN FT	\$2.00	\$546	
	RNDM / THRM CRACK R&S	50.00%	601	LIN FT	\$2.00	\$1,202	
	PD PVMT PATCH M&F SURF	0.10%	1	SQ YD	\$80.86	\$81	
	PWFn =	0.3554		PW =	0.3554 X	\$2,921	\$1,038
YEAR	40						
1 L /\!\	LONG SHLD JT R&S	100.00%	546	LIN FT	\$2.00	\$1,092	
	CNTR LINE JOINT R&S	100.00%		LIN FT	\$2.00	\$546	
	RNDM / THRM CRACK R&S	50.00%		LIN FT	\$2.00	\$1,202	
	PD PVMT PATCH M&F SURF	0.50%		SQ YD	\$80.86	\$566	
	PWFn =	0.3066	,	PW =	0.3066 X	\$3,406	\$1,044
							\$37,986
	ROUTINE MAINTENANCE ACTIVITY		0.24	Lane Miles	0.00	\$0	\$0
	NOUTINE MAINTENANCE ACTIVITY		0.21	Lane willes	0.00	φυ MAINTENANC	•
	45 YEAR LIFE CYCLE CRFn =	: 0.0407852				MAINTENANC	£ \$29,964

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JOINTED PLAIN CONCRETE PAVEMENT UNBONDED JOINTED PLAIN CONCRETE OVERLAY Figure 54-7.A

MAINTENAN(ITEM	%	QUANTITY	UNIT	UNIT COST	COST	PRESENT WORTH
YEAR 10 PAVEMENT PATCH CLASS B PWFn =	0.10% 0.7441		SQ YD PW =	\$275.00 0.7441 X	\$275 \$275	\$205
YEAR 15 PAVEMENT PATCH CLASS B PWFn =	0.20% 0.6419		SQ YD PW =	\$275.00 0.6419 X	\$825 \$825	\$530
YEAR 20 PAVEMENT PATCH CLASS B SHOULDER PATCH CLASS C LONGITUDINAL SHLD JT R&S CENTERLINE JT R&S PWFn =	2.00% 0.50% 100.00% 100.00% 0.5537	1 546 273	SQ YD SQ YD LIN FT LIN FT PW =	\$275.00 \$145.00 \$2.00 \$2.00 0.5537 X	\$7,975 \$145 \$1,092 \$546 \$9,758	\$5,403
YEAR 25 PAVEMENT PATCH CLASS B SHOULDER PATCH CLASS C PWFn =	3.00% 1.00% 0.4776	2	SQ YD SQ YD PW =	\$275.00 \$145.00 0.4776 X	\$12,100 \$290 \$12,390	\$5,918
YEAR 30 NON-INTERSTATE PAVEMENT PATCH CLASS B SHOULDER PATCH CLASS C HMA POLICY OVERLAY 2.5" (PVM HMA POLICY OVERLAY 2.5" (SHLI PWFn =	,	4 1,456 243	SQ YD SQ YD SQ YD SQ YD PW =	\$275.00 \$145.00 \$13.32 \$14.14 0.4120 X	\$15,950 \$580 \$19,387 \$3,432 \$39,349	\$16,211
YEAR 35 NON-INTERSTATE LONGITUDINAL SHLD JT R&S CENTERLINE JT R&S RANDOM CRACK R&S REFLECTIVE TRANSVERSE CRACK PD PVMT PATCH M&F HMA 2.50" PWFn =	100.00% 100.00% 50.00% R&S 40.00% 0.10% 0.3554	273 546 346 1	LIN FT LIN FT LIN FT LIN FT SQ YD PW =	\$2.00 \$2.00 \$2.00 \$2.00 \$83.58 0.3554 X	\$1,092 \$546 \$1,092 \$692 \$84 \$3,506	\$1,246
YEAR 40 NON-INTERSTATE PAVEMENT PATCH CLASS B LONGITUDINAL SHLD JT R&S CENTERLINE JT R&S REFLECTIVE TRANSVERSE CRACK RANDOM CRACK R&S PD PVMT PATCH M&F HMA 2.50" PWFn =	0.50% 100.00% 100.00% R&S 60.00% 50.00% 0.50% 0.3066	546 273 518 546 7	SQ YD LIN FT LIN FT LIN FT LIN FT SQ YD PW =	\$275.00 \$2.00 \$2.00 \$2.00 \$2.00 \$83.58 0.3066 X	\$1,925 \$1,092 \$546 \$1,036 \$1,092 \$585 \$6,276	
ROUTINE MAINTENANCE ACTIVITY 45 YEAR LIFE CYCLE CRFr	= 0.0407852	0.21	Lane Miles	\$0.00	\$0 MAINTENANC MAINTENANC	E \$31,437

BDE 5401 Template (Rev. 09/05/2013)					
Printed: 06/30/2017 Lifecycle =	= 45 Years Interest Rate = 3.00%	Standard Surface Thickness =	2.00 IN		
		HMA Surface (New Pavement)	2.00 IN	Thermal / Random Crack Route & Seal	110 FT / Sta / Lane
		· · · · · · · · · · · · · · · · · · ·			
		HMA Top Binder Course	2.25 IN	Random Crack Route & Seal	100 FT / Sta / Lane
		HMA Lower Binder Course	5.00 IN	Patching: Additional Labor Cost =	\$67.00 / SQ YD
Standard Pavement Slope =	-0.01563 FT/FT				
Standard Shoulder Slope =	-0.04167 FT/FT	HMA Policy Overlay for LSCD	2.00 IN		
Tied PCC Shoulder Outside Edge Thickness =	8.25 IN Outside Edge ShldT = 8.25 IN				
Standard Stabilized Subbase Thickness =	4.00 IN <=== (See Dark Orange Color in Diagrams Below)	Interstate HMA Policy Overlay	3.75 IN		
Standard Pavement Subbase Outhang =	0.00 FT <=== (See Dark Orange Color in Diagrams Below)	Surface	1.50 IN		
Standard Shoulder Subbase Outhang =	6.00 IN <=== (See Yellow Color in Diagrams Below)	Top Binder Mix	2.25 IN		
			Over HMA	Over PCC	
Standard Foreslope =	4 :1 FT/FT	Non-Interstate HMA Policy Overlay	2.25 IN	2.50 IN	
Standard Wedge =	1 :1 FT/FT	Surface	1.50 IN	1.50 IN	
(PCC Pavement) Shoulder Wedge =	0.0001 :1 FT/FT	WorkSheet Setting Leveling Binder Mix	0.75 IN	1.00 IN	Mirror
		Standard Design			LSC Design
Standard Surface & Binder SW =	2.01600 TONS / CU YD ==> 112.0 LB per SQYD IN	HMA_SD HMA Policy Overlay	2.25 IN	2.50 IN 2.00 IN I	HMA_LSCD
Standard Shoulder Subbase SW =	2.05000 TONS / CU YD ==> 113.9 LB per SQYD IN	NON-INTERSTATE Surface	1.50 IN	1.50 IN 2.00 IN 5	Surface NON-INTERSTATE
		Leveling Binder Mix	0.75 IN	1.00 IN 0.00 IN I	_eveling Binder Mix



DF7/08/38-sht_Typicals_Mattis_dgm PLOT SCALE = 100,00000 '/ in. Default PLOT DATE = 9/8/2016 - 1028:031 AM DATE DRAWN - REVISED - STATE OF ILLINOIS PLOT DATE = 9/8/2016 - 1028:031 AM DATE REVISED - STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION SCALE: N.T.S. SHEET OF SHEET STA. TO STA. SCALE: N.T.S. SHEET OF SHEET STA. TO STA.	1	FILE NAME =	USER NAME = Brad Downen	DESIGNED -	REVISED -			PR	OPOSED	TYPICAL SECTIONS		F.A.I.	SECTION		COUNTY TO	OTAL SHEF	ΞT
•(10-34HB-3)BR & (10-5-1HB)BR-1 CONTRACT NO. 70B3(1	0570B38-sht_Typicals_Mattis.dgn		DRAWN -		STATE OF ILLINOIS						57&74	•			X	_
			PLOT SCALE = 100.0000 ' / in.	CHECKED -	REVISED -	DEPARTMENT OF TRANSPORTATION	WATTIS AVE. UVER 1-37					•(10-34	HB-3)BR & (10-5-1H	B)BR-1 C	ONTRACT NO	10. 70B3	8
	L	Default	PLOT DATE = 9/8/2016 - 10:28:31 AM	DATE -	REVISED -		SCALE: N.T.S. SHEET OF SHEETS STA. TO STA.					ILLINOIS	FED. AID P	ROJECT			

